



Future-proofing Europe's gas networks

Europe's renewable energy targets and diminishing natural gas resources require the diversification of energy sources to include non-conventional gases, such as biogas and methane. These gases have different chemical and physical properties to traditional natural gas and need to be well-characterised before entering the gas transmission networks and during 'custody transfer' between different commercial operators. This is crucial to ensuring safe operation and enabling fair trade and environmental decision-making.

Europe's National Measurement Institutes working together

The European Metrology Research Programme (EMRP) brings together National Measurement Institutes in 23 countries to address key measurement challenges at a European level. It supports collaborative research to ensure that measurement science meets the future needs of industry and wider society.

Challenge

Gas pipeline networks are highly complex transmission and distribution systems used to move gas across states, countries or even continents. It is important that gas quality is maintained throughout the network and remains within the requirements set by international natural gas quality guidelines.

The presence of water in energy gases is a particular problem. Quantities of water travelling at considerable speeds through high pressure gas pipelines can cause significant damage to the infrastructure leading to costly network shutdowns and potential litigation. Therefore moisture content is a key parameter of gas quality and it is assessed against industry guidelines (set in Europe by the *EASEE-gas Common Business Practice*) when it enters the network and at each and every custody transfer. For this reason, accurate and cost-effective moisture measuring instrumentation is essential to pipeline operators.

Solution

Traditionally, national measurement standards for humidity (and the related measurement of dew point) were only defined for water in air at atmospheric pressure with corrections required for measurements made for many industrial applications. In order to meet the gas industry's requirements, the EMRP project *Characterisation of energy gases* widened the range of national standards, developing a facility to measure humidity at the highest levels of accuracy in a range of real-world energy gases and gas mixtures at an extended pressure range. This facility is available to assess and validate the performance of industrial equipment.

Impact

Michell Instruments, a leading supplier of humidity and dew point analysers to the natural gas and other industries, has developed a novel optical instrument to measure water content specifically for the gas industry. Working with the project team, Michell Instruments used the new humidity facility to evaluate the instrument's performance at the highest levels of accuracy in conditions relevant to their target market. This not only gave them confidence in the product's performance but also provided robust evidence to support their marketing and sales activities.

Michell's new instrument provides fast and accurate measurements of moisture content and can be used online and in real-time throughout the gas network. The improved performance offers network operators improved confidence in the quality of gas they buy and sell while avoiding unnecessary and costly drying processes before the gas is injected into the network. The product was launched in 2014 and has been installed in a number of locations worldwide. As the only European manufacturer offering this technology at present, the company projects significant sales of the order of €2M per year over the coming years as the market develops.

Besides improving efficiency and confidence across Europe's existing gas networks, the new instrument paves the way for a range of gas mixtures, readying the network for a more renewable, secure gas future.

Innovative technology for moisture measurement

Michell Instruments' new instrument is a tuneable diode laser analyser (TDLAS) using the latest techniques in laser absorption spectroscopy and signal processing power to offer robust high performance analysis optimised for the measurement of moisture in energy gases of widely varying composition. It is a non-contact technology that requires minimal maintenance.

EMRP projects supporting the European Renewable Energy Directive 2009/28/EC

The European Renewable Energy Directive 2009/28/EC requires 20% of European Union energy consumption to come from renewable sources, with 10% of transport fuel coming from renewable sources such as biofuels, by 2020.

EMRP project *Characterisation of energy gases* and its successor project *Metrology for biogas* are developing the infrastructure to enable the 'inter-changeability' of energy gases so that gaseous fuels from renewable and other non-conventional sources can readily be used in the existing gas grids across Europe alongside traditional natural gas. The ability to measure the physical and chemical attributes of a wide range of gases and gas mixtures is enabling gas producers and transporters to make informed commercial, environmental and safety decisions based on comparable measurements of the energy content, carbon content and physical properties of alternative and renewable gaseous fuels.



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